

A
SERIES OF CASES OF ENTERECTOMY

WITH

*Remarks on the Various Methods employed in
securing Union of the Divided Edges
of the Hollow Viscera*

By MAYO ROBSON, F.R.C.S.

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Remarks on the Various Methods employed in securing Union of
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THE whole of my personal experience of the operation of enterectomy is furnished in the twelve cases referred to or described in this paper, and thanks to the courtesy of my colleagues on the staff of the General Infirmary at Leeds, I am able to add their experience to my own, making the number of cases on which my arguments are based twenty-six. The list of cases, with very brief particulars, is given on the table appended and handed round.

Some of my own cases have been already reported, and these I need only briefly refer to; others have not been described, and these I propose to give in detail, though as briefly as is consistent with lucidity.

At the same time I propose to describe the method of application of the decalcified bone-bobbin, which as a rule I employ.

The two cases recently operated on, and not previously reported, are as follows:—

CASE 19.—*Columnar epithelioma of small intestine; enterectomy.*—A. B., aged 49, admitted November 9, 1895. His illness dated from November, 1894, when he first had occasional attacks of pain in the abdomen, the first severe attack being in March, 1895. The pain had always been on the right side of the abdomen, which was swollen.

After March the attacks became more frequent and more severe, and he suffered much from constipation, the worst attacks following a hearty meal. For some time before admission he had been confined to bed on account of pain, and he had lost flesh and colour ; he had never been jaundiced and had never passed blood by the rectum. He had sometimes vomited during an attack of pain.

On admission he was thin and wasted, and had a sallow, dirty yellow complexion. His abdomen was slightly distended. Palpation and percussion revealed no tumour. Urine normal.

November 18.—Marked constipation since admission. Has had several attacks of pain, and during these he is in acute agony, the pain beginning in the epigastric and travelling through the right hypochondriac and iliac to the hypogastric region, where it persists till the attack passes off. Marked visible peristalsis present during an attack, and what are apparently coils of small intestine being distinctly seen. General condition much worse than on admission.

November 20.—Abdomen opened by incision of about three inches in middle line between umbilicus and pubes.

Examination at once revealed an annular growth at the lower part of the jejunum, which was brought out through the wound, a piece of india-rubber tubing being applied around its base to act as a tourniquet. Enterectomy was then performed, a medium-sized bone-bobbin being inserted, and the gut sutured over this by two continuous stitches.

The bowels were moved by enema on the sixth day, and the sutures were removed on the seventh, the wound being found healed. The bone-bobbin was, as usual, never seen ; he was up on the twentieth day, and returned home on the twenty-fifth day.

He came up to be seen on January 4, 1896, forty-five days after operation, appearing quite well, and having, since leaving the hospital, gained a stone in weight. He said that the bowels were moved naturally every morning,

that there had been no pain in the abdomen, and that he could take ordinary diet without discomfort or trouble of any kind.

For the notes of this case I have to thank my house surgeon, Mr. Trotter.

CASE II.—*Enterectomy for intestinal obstruction of thirteen days' duration, dependent on cancer of lower end of sigmoid flexure of colon.*—On December 6, 1895, I was asked by Dr. Robertson, of Pickering, and Dr. Corry, to see Mrs. C., aged 70, at Rosedale Abbey, and to come prepared for operation.

The patient was much exhausted, as she had been unable to take food for several days on account of vomiting, which had continued more or less for eleven days, no movement of the bowels having occurred for thirteen days. Her pulse was 120, her eyes were sunken, her tongue dry, and her abdomen somewhat tumid. Beyond constipation, which had been overcome by aperients, and occasionally a little pain and rumbling over the sigmoid, there was nothing to indicate the nature of the obstruction; these signs, however, led me to make my incision as for inguinal colotomy, and I at once came on the stricture. The bowel was much distended above and empty below.

Doubtless the safest course would have been to perform a colotomy and subsequently an enterectomy; but seeing that the patient could only be reached by a 120 miles railway journey, and a long moorland drive of twenty-eight miles, it seemed advisable to do a complete operation if possible; and as expeditiously as I could I clamped the gut above and below, excised the disease, and joined up the ends by a Murphy's button. The operation occupied a little over the half-hour, and the patient was put to bed, apparently in as good condition as she left it.

Her bowels were moved very freely within half an hour of operation, and again later in the day. The following day an excellent report was sent me by Dr. Corry. The second day her strength began to fail, and from Dr. Corry's description she sank exhausted on the third day, apparently

LIST OF CASES ILLUSTRATING MR. MAYO

No.	Name.	Age.	Sex.	Date.	Reference.	Operator.	Disease.
1	E. ...	33	F.	1885	<i>Lancet</i> , 1895...	Mayo Robson	Acute intussusception with gangrene, 7th day
2	B. ...	45	F.	—	Royal Med. & Chir. Soc., 24/3/91	Do.	Gangrenous hernia, Littre's, 11th day
3	A. ...	60	F.	1/90	Royal Med. & Chir. Soc., 24/3/91	Do.	Gangrenous femoral hernia, 7th day of strangulation
4	K. ...	70	F.	1895	Not reported	Do.	Gangrenous femoral hernia, 12th day of strangulation
5	G. ...	40	M.	—	Do.	Mr. Ward ...	Sarcoma of ascending colon
6	B. ...	55	M.	—	Do.	Mr. W. H. Brown	Cancer of intestines ...
7	H. J....	49	M.	—	Do.	Mr. W. H. Brown	Cancer of cæcum... ..
8	—	—	F.	—	Do.	Mr. Hartley...	Gangrenous hernia ...
9	B. ...	53	F.	1893	<i>British Medical Journal</i>	Mr. Littlewood	10/9/93 intestinal obstruction, typhlotomy, cancer of ascending colon
10	J. S. H.	40	M.	1895	<i>British Medical Journal</i> , 19/10/95	Mayo Robson	Cancer of cæcum and ascending colon
11	C. ...	70	F.	1895	Present paper	Do.	Acute obstruction 13 days. Cancer of sigmoid
12	A. T....	22	F.	1895	Not reported	Mr. Ward ...	Fæcal fistula due to tubercular stricture of ascending colon
13	W. H.	55	M.	1895	Do.	Mr. Littlewood	Cancer of rectum above reflection of peritoneum
14	A. W.	43	F.	—	Do.	Mr. Hartley...	Fæcal fistula, following gangrenous inguinal hernia
15	B. ...	27	F.	3/94	<i>British Medical Journal</i> , 19/10/95	Mayo Robson	Chronic intussusception and cancer of descending colon
16	E. B....	14	F.	9/94	<i>British Medical Journal</i> , 19/10/95	Do.	Acute obstruction, typhlotomy 22/9/94, cancer of ascending colon
17	L. S....	12	M.	1895	<i>British Medical Journal</i> , 19/10/95	Do.	Fæcal fistula, chronic abscess, and strictured ascending colon
18	A. ...	16	F.	1894	<i>British Medical Journal</i> , 19/10/95	Do.	Fæcal fistula and stricture of ascending colon
19	J. R. ...	49	M.	3/95	Present paper	Do.	Cancer of ileum and intestinal obstruction
20	A. M.	51	F.	13/3/96	Do.	Do.	Cancer of ascending colon
21	A. M. C.	31	F.	9/92	Not reported	Mr. Jessop ...	Sarcoma of ascending colon
22	H. M.	37	F.	6/1/96	Do.	Mr. Littlewood	Cancer of rectum above reflection of peritoneum
23	L. ...	55	F.	10/3/96	Do.	Mr. Littlewood	Cancer of rectum above reflection of peritoneum
24	M. J....	6	F.	6/92	Do.	Mr. Jessop ...	Mesenteric cyst ...
25	R. W.	35	M.	9/92	Do.	Do. ...	Malignant adenoma, ascending colon
26	H. ...	50	F.	—	Leeds and W. R. Med. and Chir. Soc.	Mr. Ward ...	Cancer of cæcum and ascending colon

LOBSON'S PAPER ON ENTERECTOMY.

Operation.	Method.	Result.	Remarks.
Enterectomy, 4 ft. small intestine removed	Suture	D.	Shock ; death in 4 hours.
Enterectomy and enterorrhaphy	Do.	R.	Well 2 years later.
Do. do.	Do.	R.	—
Do. do.	Do.	D.	Shock ; 8 hours.
Enterectomy	Do.	D.	Hernia of small intestines through foramen of Winslow.
Do.	Do.	R.	Died 4 months later.
Do.	Do.	D.	Peritonitis 7th day.
Do.	Do.	D.	Shock.
Four inches of ascending colon removed, 10/10/93, twelve mattress sutures used	Do.	R.	Death 14/3/94, from cancer of liver.
Excision of cæcum and half ascending colon	Murphy's button	R.	Button passed 44th day. Fistula closed afterwards. Patient now well.
Enterectomy, 2 inches removed	Do.	D.	Exhaustion 3rd day.
Excision of cæcum	Do.	R.	Button discharged 34th day, after which fistula closed.
Proctectomy	Do.	R.	Now well.
Enterectomy	Do.	R.	Button never passed while under observation.
Reduction of intussusception and incision of 5 in. of colon	Decalcified bone-bobbin	R.	Well a year later.
Excision of cæcum and ascending colon	Decalcified bone-bobbin	R.	Now well.
Excision of cæcum and ascending colon	Decalcified bone-bobbin	D.	Third day.
Partial colectomy and enteroplasty	Decalcified bone-bobbin	R.	Now well.
Excision of 3 in. small intestines	Decalcified bone-bobbin	R.	Now well.
Excision of cæcum and ascending colon	Decalcified bone-bobbin	R.	Now well.
Enterectomy	Decalcified bone-bobbin	R.	Alive 2 years ago, not heard of since.
Excision of 2½ in. of gut ...	Decalcified bone-bobbin	R.	Now well.
Do. do. ...	Decalcified bone-bobbin	R.	Doing well.
Enterectomy	Paul's tube ...	R.	Still living.
Do.	Senn's plates ...	R.	Still living.
Do.	Bone plates ...	R.	Well 2 years later.

from a failure to assimilate nourishment, but without signs of peritonitis.

CASE 21.—*Cancer of ascending colon : intestinal obstruction ten days : colectomy, and suture over bobbin : recovery.*

—On March 13, 1896, I was asked to see, with Dr. Hunt, at Harrogate, a lady, Mrs. M., aged 51, suffering from intestinal obstruction of ten days' duration, no flatus having been passed for three days, and the bowels not having been moved for ten days.

She gave a history of constipation and abdominal pain for four months. The abdomen was distended, and visible peristalsis was present, the cæcum standing out prominently during a paroxysm. An incision was made over the cæcum, and it and the ileum were found to be very tightly distended, whereas the ascending colon was collapsed, the obstruction being a firm growth encircling the commencement of the ascending colon. The cæcum was brought through the wound and its contents evacuated through a small incision; the ileum was then clamped and cut through just above the ileo-cæcal valve, after which the ascending colon was cut across below the structure, the intervening cæcum and portion of ileum and ascending colon being removed after the mesentery had been ligatured *en masse* with silk.

The open end of the ileum was then connected to the ascending colon by a continuous serous and mucous suture over a large decalcified bone-bobbin.

As soon as the clamp was removed from the ileum, gas and liquid fæces rushed through the bobbin and filled the colon, the line of union proving quite gas- and water-tight. Flatus passed the same night, and the bowels were moved by enema the third day.

The temperature was normal throughout, and the pulse did not exceed 90 after the first day. The wound healed *per primam*. The patient is now (March 27, 1896) convalescent, and taking ordinary food.

Remarks on the whole series of cases.—As the twenty-six enterectomies shown in the table were undertaken by three

separate methods, some basis is afforded for a comparison of the several procedures, and for a review of the whole subject, the importance of which is considerable, not only on account of the frequent occasions for the exercise of the operation, but also because of the different opinions held on the subject by surgeons generally.

It will be noticed, on reference to the table, that in nine cases the unaided suture was employed, and out of these, five died, yielding a mortality of 55·5 per cent.

In five the Murphy button was used, with one death, giving a mortality of 20 per cent. Two of the cases had a very tardy convalescence, owing to a fistula forming at the site of operation, and owing to the button being retained ; and in another case the button had not passed before the patient left the hospital. In twelve cases decalcified bone was used to support the sutures, with one death, giving a rate of 8·3 per cent., and in all these cases recovery was speedy and uninterrupted. Out of the twelve cases the bobbin suggested by myself was employed in nine, Mr. Paul's tube in one, and Dr. Senn's plates in two.

It is interesting to note that of these twelve patients eleven were living and well at quite a recent date.

It seemed to me desirable that the cases in the present paper should be limited to those that had come under my own observation or under the care of my colleagues ; but I ought to mention that besides the favourable mention by other operators of the method advocated, Mr. Herbert Allingham's series of cases recently related at the London Medical Society bear out the contentions advanced in this paper.

The number of cases is, perhaps, too few for the statistical evidence to have any serious weight, especially as all the fatal cases were of so serious a nature as to have in themselves the sources of failure, apart from any operation undertaken, and it is likely that this will always be the case, except where operation is undertaken apart from obstruction, and apart from the presence of a suppurating wound or cavity. My remarks and conclusion are there-

fore based on general observation, on surgical instinct, and on personal experience, rather than on statistical evidence, which, however, it must be granted is of a striking character.

First, with regard to simple suture, and my reasons for preferring some form of mechanical contrivance.

A longer time is of necessity occupied in the performance of enterectomy by simple suture, since a multiplicity of stitches is required, as it is unsafe to employ a continuous suture lest it be drawn too tight and so lead to subsequent, if not to immediate, stenosis. I had a good example of this in a case of pylorotomy which I reported before the Royal Medical and Chirurgical Society, June 14, 1892, in which, after removal of the disease, I united the duodenum to the stomach and employed a continuous suture to the mucous membrane, effecting the operation in a comparatively short time ; unfortunately, however, contraction of the new orifice occurred, and two months afterwards I had to perform a second operation for the stricture.

The needle wounds made by simple suture being at once bathed with the intestinal fluids, are liable to be infected and subsequently to lead to ulceration and perforation. Unless the interrupted sutures be numerous and closely applied, extravasation of the intestinal contents is apt to ensue.

The operation by simple suture inserted only through the peritoneal and muscular coats must, however, not be too hastily condemned, and I should not hesitate to employ it if I had not a bobbin at hand. The successful cases in the table, and many cases reported by other operators show that it may be successfully employed.

Maunsell's invagination method is an ingenious modification of the simple suture, and a favourite method with some operators. It is especially applicable in intussusception, for which the author devised it ; but I cannot see that it presents any advantage over simple suture in enterectomy for other diseases, either in the time of performance or in safety afterwards.

In a number of cases thus treated, the line of union has yielded and given rise to septic peritonitis; and the manipulation involved in the invagination process of necessity renders septic contamination of the adjoining parts more likely; so that I think it will probably be found that peritonitis will be more frequent after this method, than after other modes of suture.

The method invented by my distinguished friend, Dr. Murphy, of Chicago, has had so much written about it lately, both favourably and adversely, that it will be interesting to know the opinion of those present with regard to its employment.

My own experience of the button is distinctly favourable in cholecystenterostomy, and in short-circuiting operations for intestinal obstruction, where it is thought desirable to do a complete operation speedily, and to avoid the establishment of an intestinal fistula by enterostomy; but my experience of the use of the button in enterectomy, and the disadvantages which have been related of it by other operators, would lead me to prefer the decalcified bone-bobbin in such cases.

The metal button can certainly be used very quickly, and therefore where great expedition is absolutely necessary it has advantages. Two continuous sutures are, however, required, as in the use of the bone-bobbin, and if the adjustment be found to be faulty when the ends have been pushed home, a very serious error will have occurred which can only be remedied by great expenditure of time.

Where a large button is employed it passes along the intestinal canal with some difficulty, as shown by two of the cases in my table, where the buttons took forty-four and thirty-four days respectively to pass, several times producing partial obstruction before being finally parted with.

This was well exemplified by a specimen shown in the Pathological Museum at the British Medical Association meeting in London in August last, in which the passage of a button had caused a series of ulcerated and gangrenous

patches along the whole length of the colon, which ultimately led to death by perforation.

In two of my own cases the button never passed : in one, a cholecystenterostomy, the patient is apparently quite well nine months after, but the button is, so far as I know, in her gall-bladder still, whence it passed in place of entering the intestine.

In the other case, which was published in the *Lancet*, June, 15, 1895, a short-circuiting operation was done for malignant disease, the operation being successful in giving relief for a time. When the patient ultimately succumbed to his disease the button was found in the loop of short-circuited bowel, where it was effectually imprisoned.

Dr. Morton, October 12, 1895, in the *British Medical Journal*, also relates a case of the kind, and a case in the table furnishes another example.

The bond of union is said to be wanting in firmness, and therefore to be insecure owing to the narrow line of union adjoining the necrosed tissue, and this was distinctly shown in the case I have mentioned ; but though easily separated, the bond was watertight and had proved efficient.

Mr. Harrison Cripps, at the meeting of the British Medical Association in August, referred to the want of success from perforation and ulceration which had occurred in the use of the button by the staff of St. Bartholomew's Hospital.

At a discussion at the Medical Society of London, October 28, 1895, Mr. Bruce Clarke said that in two cases, to his own knowledge, the metal button had produced perforation.

The most serious disadvantage, to my mind, in any operation which is of necessity associated with sloughing of the included margins, is that besides the danger of the sloughing process extending beyond the part included, there must of necessity be a tendency to contraction of the cicatrix which is not protected from irritation by a continuous mucous surface, as in the methods by suture and by the bone-bobbin.

That this danger is not imaginary is proved by several observers, who have described the contraction of the fistula as seen *post-mortem*.

One of the great advantages claimed for the button is that its simplicity enables it to be employed by anyone without previous experience in intestinal work; it seems to me that it is a very questionable procedure that holds forth a lure to tempt the inexperienced to undertake any operation which requires not only considerable surgical skill, but a knowledge of details which is likely to be possessed only by those who have specially studied the subject and who are giving their time and devoting their energies to surgical work.

I have classified the cases operated on by Paul's tubes and by Senn's plates under the same heading as the bone-bobbin, as although differing in the details of application, they agree in the important principle of affording internal temporary splints as aids to suture.

From what has been said and from the cases I have described, it will be gathered that I prefer to suture the intestine after enterectomy by a continuous stitch, and to support and protect the line of suture by a light though firm internal splint in the shape of a decalcified bone-bobbin.

The employment of the bobbin, which I have recently modified by rounding the ends, and which is made for me in various sizes (fig. 1) by Messrs. Down Bros., of St. Thomas's Street, London, presents the following advantages:—

(1) By the use of only one continuous suture, or if time can be spared, of two continuous sutures, which, for convenience, we may call marginal or mucous, and external or serous, time and trouble are saved; and as the two needles can be threaded beforehand, a second assistant is quite unnecessary.

(2) By securing a continuity of the mucous membrane through the new channel by means of the marginal continuous suture, which can be drawn tight without fear of

too far diminishing the opening, subsequent contraction is prevented, since no granulating wound is left to form fibrous tissue, the inevitable tendency of which is to contract, and if surrounding a hollow channel to lead to stricture.

(3) When two sutures are employed, the fear of escape of the visceral contents is reduced to a minimum, and secure union is practically guaranteed.

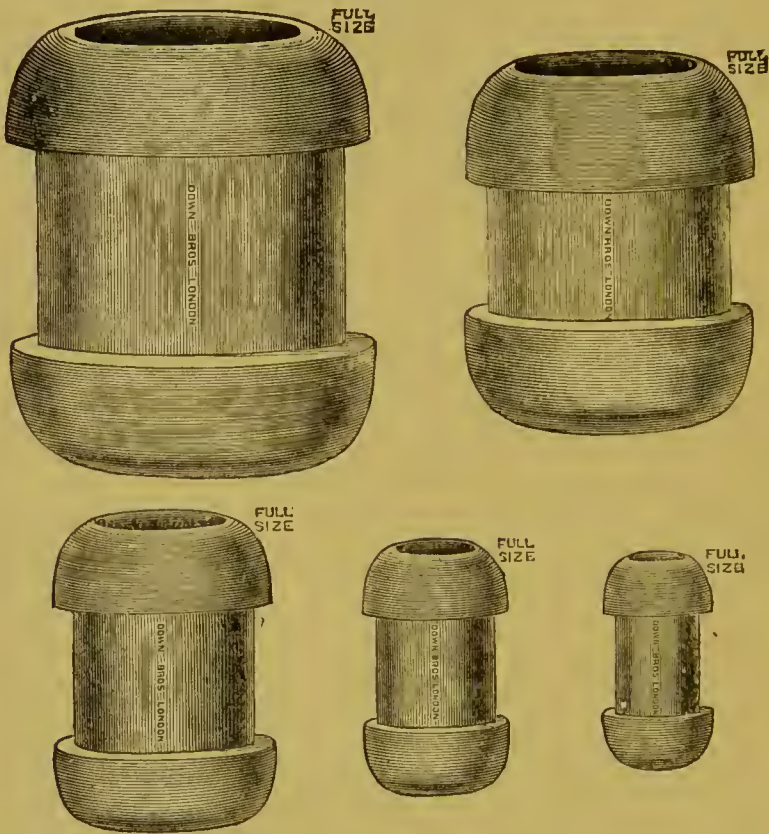


FIG. 1.

(4) By using decalcified bone, which dissolves in a few days, the presence of a foreign body, which may give subsequent trouble, is avoided.

(5) By having the ends of the tube elevated, the bobbin is prevented from shifting its position until it has served the purpose of protecting the line of suture from faecal or other infection.

(6) By having a wide opening through the bobbin, an

immediately patent channel is secured, and the passage of faecal or other matters at once ensues.

(7) Lastly, the bobbin is applicable to any of the operations employed for securing continuity of the divided hollow viscera.

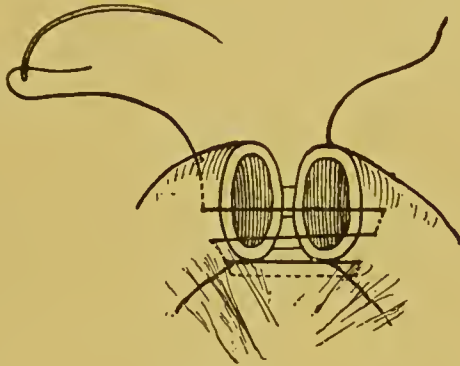


FIG. 2.

Application of serous suture to distal half of bowel before commencing the mucous or marginal suture, and before inserting the bobbin.

The method of application and the shape and sizes of the modified bobbins which I now employ are shown in the appended figures (figs. 1, 2, and 3).

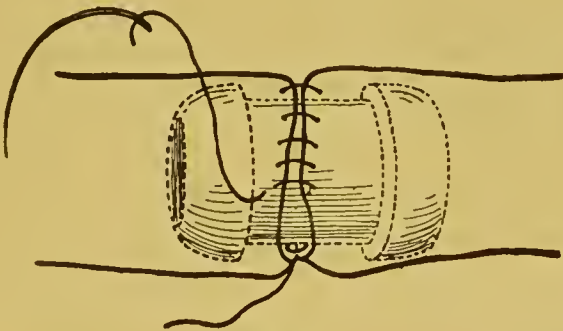


FIG. 3.

Bone-bobbin in place and marginal suture (catgut) nearly completed.

Two medium-sized sewing needles, bent into the shape of a third of a circle, are threaded, one with silk and one with catgut, the former for approximating the serous surfaces, the latter the mucous margins. If one suture only be applied, I prefer chromicised catgut.

A needle-holder is neither necessary nor desirable, since its employment means loss of time.

After the bowel to be operated on has been clamped above and below, or if possible isolated by encircling the whole loop with an elastic tourniquet, the affected portion is excised, leaving the two open ends to be dealt with. For convenience it is better to apply the serous suture around the distal half first, and to lay aside the threaded needle until the mucous edges have been approximated and the bone-bobbin inserted, when the serous circle can be completed.

The bobbin is not inserted until the marginal suture has been carried around the distal half of the circumference.

After the insertion of the bobbin the marginal stitch is continued around the circle until the loose end of the catgut stitch at the starting-point is reached ; the two ends are then drawn on, tied, and cut off short.

The serous suture is now continued around the circle, and when it reaches the starting-point the loose end of the silk stitch is picked up and both are drawn on, tied and cut off. Both stitches are now buried, and a line is only seen where the union has been effected.



FIG. 4.

If on account of want of time one suture only be employed, the marginal stitch, taking up the serous muscular and submucous coats, and avoiding as far as possible the mucous membrane, should be employed, as shown in the diagram, fig. 4.

The mucous margins will then be approximated though not perforated, and the buried stitch will run little danger of becoming infected.

This method is very expeditious, is quite simple, and is

efficacious, though the double suture affords additional protection and enhanced safety.

Although I have employed my decalcified bone-bobbin with success in many other stomach, gall-bladder, and intestinal operations (for which it is as well adapted as for enterectomy), I have preferred to limit my remarks to the one operation of enterectomy, first because it serves as a better and more uniform test for the various methods of operating; and secondly, because it is easier to institute comparisons in speaking of one than of several operations.

It seems to me that what we particularly want to arrive at is—What is the best method of uniting the divided hollow viscera? And it is with the desire of helping to arrive at some more definite conclusion on this point that I have ventured to occupy your time so long.

Although there are many methods of performing enterectomy, I think it will be found that there are practically three principles to consider :—

- (1) Union by the unaided suture.
- (2) Union by pressure necrosis, producing adhesive inflammation of the contiguous margins of the openings.
- (3) Union by continuous suture, supported by an internal splint, which dissolves as soon as its protective work is accomplished.

According to the statistics I have given, and which I should like to say I believe to include every case operated on in private or in hospital practice, by myself or my colleagues on the staff of the General Infirmary at Leeds, artificial aids in enterectomy afford greater safety than the unaided suture; and of the artificial aids, a decalcified bone support has shown in the hands of four different surgeons the comparatively low mortality of 8·3 per cent.

